

B¹ 1998. The entire disclosure of Application No.09/158,791 is considered as being part of the disclosure of this application, and the entire disclosure of Application No.09/158,791 is expressly incorporated by reference herein in its entirety.

Additionally, the present application claims priority under 35 U.S.C. 119 of French Patent Application FR 97 12042, filed September 23, 1997.

BACKGROUND OF THE INVENTION

B¹ 1. Field of the Invention

The present invention relates to a knee prosthesis and more specifically to the device for assembling its tibia plate, which is made of plastic, on its metal base anchored beforehand into the tibia bone tissue.

2. Discussion of Background Information

Knee prostheses which comprise a plastic tibia part which is free to rotate about the tibia bone axis with respect to the metal base secured to the tibia are known.

Please amend the paragraph beginning on page 1, line 38 and ending on page 2, line 4 as follows:

B² Knee prostheses which comprise a plastic tibia plate which slides freely over the flat surface of the metal base, and the movement of which is limited by one or more cylindrical

B² studs integral with the base communicating with spaces made in the [said] plastic plate are also known.

✓
Please amend the paragraph on page 2, lines 12-15 as follows:

SUMMARY OF THE INVENTION

B³ The knee prosthesis according to the present invention is intended to provide a plastic tibia plate which has a degree of freedom in rotation with respect to the metal base.

✓
Please amend the paragraph on page 2, lines 17-24 as follows:

B⁴ The knee prosthesis in accordance with the present invention comprises a metal base and a tibia plate which are equipped with guide mechanism defining a center of rotation which may be offset from that of the tibia bone axis, so as to allow the tibia plate to slide in rotation over the base, the guide mechanism being positioned a certain distance away from the center of rotation.

✓
Please amend the paragraph on page 2, lines 26-31 as follows:

B⁵ The knee prosthesis has guide mechanism which utilizes at least one upstand in the shape of an arc of a circle secured to the metal base and of a housing with the same radius of curvature made in the plastic tibia plate to allow the latter to slide in rotation about the

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center of rotation of the upstand.

Please amend the paragraph on page 2, lines 33-37 as follows:

The knee prosthesis according to the present invention comprises guide mechanism which utilizes an upstand in the shape of an arc of a circle, which upstand is positioned in the anterior part of the metal base and oriented in a substantially medio-lateral direction.

Please amend the paragraph on page 3, lines 1-4 as follows:

The knee prosthesis according to the present invention comprises additional guide mechanism which is positioned on or near to the center of rotation of the tibia plate on the metal base.

Please amend the paragraph on page 3, lines 6-9 as follows:

The knee prosthesis according to the present invention comprises additional guide mechanism which is secured to a device making it possible to prevent the tibia plate from lifting from the metal base.

Please amend the paragraph on page 3, lines 11-15 as follows:

The knee prosthesis in accordance with the present invention comprises guide

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B⁹ mechanism which utilizes at least two pegs set out in an arc of a circle and defining a center of rotation, and of a housing of the same radius of curvature formed in the tibia plate.

✓
Please amend the paragraph on page 3, lines 25-29 as follows:

B¹⁰ The knee prosthesis according to the present invention comprises an upstand which has a center of rotation which is borne by the tibia bone vertical axis, while the upstand is a certain distance away from its center of rotation.

✓
Please amend the paragraph on page 3, lines 31-35 as follows:

B¹¹ The knee prosthesis according to the present invention comprises an upstand which has a center of rotation which is offset from the tibia bone vertical axis, while the upstand is a certain distance away from its center of rotation.

✓
Please amend the paragraph on page 4, lines 9-15 as follows:

B¹² The knee prosthesis according to the present invention comprises a metal base which has, opposite the upstand, a retaining peg borne by a center of rotation so as to engage with a cutout formed in the tibia plate to prevent the latter from lifting off the base as the plate slides in rotation about its center of rotation.

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Please amend the paragraph on page 4, lines 17-21 as follows:

B¹³ The knee prosthesis according to the present invention comprises a retaining peg which utilizes a cylindrical pin integral with a head which has a larger diameter than the pin so that the head engages with inclined faces made in the cutout.

✓
Please amend the paragraph on page 4, lines 23-29 as follows:

B¹⁴ The knee prosthesis according to the present invention comprises a metal base which has, opposite the upstand, a centering peg borne by the center of rotation so as to engage with a blind hole formed in the tibia plate to guide the latter with respect to the base as the plate slides in rotation about its center of rotation.

Please amend the paragraph beginning page 4, line 36 and ending page 5, line 4 as follows:

B¹⁵ The knee prosthesis according to the present invention comprises a metal base which has two upstands in the shape of an arc of a circle curved in the same direction and centered about the same center of rotation, while the tibia plate comprises housings intended to receive the upstands respectively, so as to allow the plate to slide in rotation about the center of rotation.

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Please amend the paragraph on page 5, lines 6-10 as follows:

B16
The knee prosthesis according to the present invention comprises an upstand which is integral with a flange which engages in a slot in the housing to prevent the tibia plate from lifting off the metal base as the plate slides in rotation about the center of rotation.

✓
Please amend the paragraph on page 5, lines 12-19 as follows:

B17
The knee prosthesis according to the present invention comprises a metal base which comprises two upstands in the shape of an arc of a circle in opposite directions and centered about the same center of rotation, while the tibia plate comprises an element and a housing which are intended to receive the upstands respectively to allow the plate to slide in rotation about the center of rotation.

✓
Please amend the paragraph on page 5, lines 27-33 as follows:

B18
The knee prosthesis according to the present invention comprises an upstand which is offset from the center of rotation and comprises a flange which snap-fastens into the housing in the tibia plate to, on the one hand, guide the plate as it slides in rotation about its center and, on the other hand, retain the plate so that it does not lift off the metal base.

✓
Please amend the paragraph beginning page 5, line 35 and ending page 6, line 5 as

follows:

B19 The knee prosthesis according to the present invention comprises a metal base which comprises a peripheral upstand in the shape of an arc of a circle integral with a flange directed toward the tibia bone vertical axis and a housing set out in the region of the center of rotation, while the tibia plate has, on its external periphery, a recess in which there is formed a horizontal slot intended to receive the flange of the upstand and, on its lower face, a stub which engages with the housing.

✓
Please amend the paragraph on page 6, lines 7-14 as follows:

B20 The knee prosthesis according to the present invention comprises a metal base which comprises three peripheral upstands extending vertically above the horizontal disk, while the tibia plate has, on its external periphery, three recesses intended to receive the upstands respectively to allow the plate to be guided as it slides in rotation about the center of rotation.

✓
Please amend the paragraph on page 6, lines 16-19 as follows:

B21 The knee prosthesis according to the present invention comprises pegs which are set out in an arc of a circle about a center of rotation, while the tibia plate has a housing intended to receive the pegs.

✓
Please amend the paragraph on page 6, lines 21-25 as follows:

B22
The knee prosthesis according to the present invention comprises pegs which have a center of rotation which is borne by the tibia bone vertical axis, while the peg is a certain distance away from its center of rotation.

✓
Please amend the paragraph on page 6, lines 26-31 as follows:

B23
The knee prosthesis according to the present invention comprises pegs which have a center of rotation which is offset from the tibia bone vertical axis, while the peg is a certain distance away from its center of rotation.

✓
Please amend the paragraph on page 6, lines 32-39 as follows:

B24
The knee prosthesis according to the present invention comprises a metal base which comprises at least one upstand or peg which engages with a housing of the tibia plate so that the plate can slide in rotation over the metal base only within the limit set by the difference in size between the upstand or peg and the corresponding housing.

✓
Please amend the paragraph on page 7, lines 8-14 as follows:

B25
The knee prosthesis according to the present invention has a short height of the guide mechanism and of their anterior positioning on the metal base which allows the tibia plate

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B26 to be mounted on the base via a strictly anterior approach, the plate requiring upward clearance only by the height of the guide mechanism.

✓
Please amend the paragraph on page 7, lines 16-20 as follows:

B26
BRIEF DESCRIPTION OF THE DRAWINGS

The description which will follow with reference to the appended drawings, given by way of nonlimiting examples, will allow a good understanding of the invention, its features and the advantages it is likely to afford:

✓
Please delete the paragraph on page 7, lines 32-34.

✓
Please amend the paragraph on page 7, lines 36-39 as follows:

B27
Figures 6, 7 and 8 are views showing a second alternative form of the knee prosthesis in which the metal base has, on its axis of rotation, a peg for retaining the plastic tibia plate.

✓
Please amend the paragraph on page 8, lines 1-5 as follows:

B28
Figures 9, 10 and 11 are views showing a third alternative form of the knee prosthesis in which the metal base has, on its axis of rotation, an additional peg for centering the plastic tibia plate.

Please amend the paragraph on page 8, lines 7-10 as follows:

B320
Figures 12, 13 and 14 are views depicting a fourth alternative form of the knee prosthesis which has a cutout through which the posterior cruciate ligament can pass.

Please amend the paragraph on page 8, lines 12-15 as follows:

B330
Figures 15 to 21 are views illustrating alternative forms of the knee prosthesis in which the metal base has two opposed guide upstands but one of which is borne by the center of rotation of the second.

Please amend the paragraph on page 8, lines 17-19 as follows:

B340
Figures 22 to 24 are views depicting other alternative forms of the knee prosthesis according to the present invention.

Please amend the paragraph on page 8, lines 21-23 as follows:

B350
Figures 25 and 26 are views illustrating a guide mechanism set out at the periphery of the metal base and of the tibia plate of the knee prosthesis.

Please amend the paragraph on page 8, lines 25-29 as follows:

B360
Figures 27 to 29 are views showing a guide mechanism utilizing at least two vertical

b33 pegs integral with the metal base and which engage with a housing formed in the tibia plate.

✓
Please amend the paragraph on page 8, lines 30-33 as follows:

B334
DETAILED DESCRIPTION OF THE PRESENT INVENTION

Figures 1 to 3 show a knee prosthesis 1 comprising a metal base 2 and a tibia plate 3, whereas the femoral element is not depicted.

✓
Please amend the paragraph on page 8, lines 34-37 as follows:

B35
The metal base 2 consists of a horizontal disk 20 secured on one of its faces to an anchoring rod 21 allowing the base 2 to be fixed into the tibia of a patient.

✓
Please amend the paragraph on page 9, lines 1-6 as follows:

B36
The horizontal disk 20 comprises, on the opposite side to the rod 21, a guide mechanism which utilizes an upstand 22 with an exterior profile in the shape of an arc of a circle. In this case, note that the center of rotation C of the upstand 22 is borne by the tibia bone vertical axis YY'.

✓
Please amend the paragraph on page 9, lines 8-11 as follows:

B37
The upstand 22 extending vertically above the horizontal disk 20 has a central part 23

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B 39 integral on each side with two vertical edges 24 and 25 which are not as tall as the central part 23.

✓
Please amend the paragraph on page 9, lines 17-19 as follows:

B 39 The tibia plate 3, which is made of plastic, has a flat lower face 30 arranged in a horizontal plane parallel to the plane containing the disk 20 of the metal base 2.

✓
Please amend the paragraph on page 10, lines 1-5 as follows:

B 39 The latter has dimensions that exceed those of the upstand 22 so that the tibia plate 3 can slide freely in rotation about the center of rotation C of the upstand 22 in the direction of the arrow F illustrated in Figure 1.

✓
Please amend the paragraph on page 10, lines 19-26 as follows:

B 40 The metal base 2 has, and this is what differentiates it from the one described above, the position of the guide mechanism on the horizontal disk 20. In effect, the guide mechanism utilizes an upstand 22 in the shape of an arc of a circle and the profile of which is similar to the one described earlier, but the center of rotation C' of which is offset from that C borne by the tibia bone vertical axis YY'.

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Please amend the paragraph on page 10, lines 28-32 as follows:

B40
Note that the center of rotation C' can be positioned anywhere, either on the horizontal disk 20 or off it, while at the same time keeping the guide mechanism on the horizontal disk 20 and more specifically at a particular point.

Please delete the paragraphs on page 11, lines 9-38 in their entireties.

Please delete the paragraphs on page 12, lines 1-10 in their entireties.

✓
Please amend the paragraph on page 12, lines 12-14 as follows:

B42
Figures 6-8 illustrate a second alternative form of the knee prosthesis 1 according to the present invention.

✓
Please amend the paragraph on page 12, lines 20-23 as follows:

B43
The metal base 2 comprises, on its horizontal disk 20, and on the opposite side to its anchoring rod 21, guide mechanism which utilizes the upstand 22 formed from a central part 23 and of two lateral edges 24 and 25.

✓
Please amend the paragraph on page 12, lines 35-37 as follows:

B48 ✓
The retaining peg 26 consists of a cylindrical pin 27 integral with a head 28 whose outside diameter exceeds that of the pin.

✓
Please amend the paragraph on page 13, lines 1-4 as follows:

B48
The additional guide mechanism or peg 26 is an integral part of the pin 27, 28 to prevent the tibia plate 3 from lifting off the metal base 2 when the prosthesis is in motion.

✓
Please amend the paragraph on page 13, lines 13-17 as follows:

B48
It can be seen that the retaining peg 26, when it engages with the cutout 35, allows the tibia plate 3 to be prevented from lifting under a tensile force when the plate is sliding in rotation F4 on the metal base 2.

✓
Please amend the paragraph on page 13, lines 19-20 as follows:

B48
Figures 9 to 11 show a third alternative form of the knee prosthesis 1 according to the invention.

✓
Please amend the paragraph on page 13, lines 28-31 as follows:

B48
The centering peg 29 extends vertically above the horizontal disk 20 by a short height, constituting a guide mechanism that is in addition to the guide mechanism formed by the

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B⁵⁸ upstand 22.

✓
Please amend the paragraph on page 13, lines 36-39 as follows:

B⁵⁹ The plastic tibia plate 3 comprises, on its lower face 30 and opposite the housing 34, a blind hole 37 intended to receive the centering peg 29 when the plate is fitted onto the metal base 2.

✓
Please amend the paragraph on page 14, lines 6-10 as follows:

B⁵⁰ The knee prosthesis 1 illustrated in Figures 12 to 14 differs from the one shown in Figures 1 to 3 only in the fact that the metal base 2 and the plastic tibia plate 3 respectively comprise a cutout 4 and 38 for the passage of the posterior cruciate ligament.

✓
Please amend the paragraph on page 14, lines 12-14 as follows:

B⁵¹ Quite obviously, the prosthesis 1 shown in Figures 12 to 14 works in the same way as the one described in Figures 1 to 3.

✓
Please amend the paragraph on page 14, lines 16-25 as follows:

B⁵² Figure 15 shows the knee prosthesis 1 equipped with its metal base 2 and with its tibia plate 3. The metal base 2 comprises, on its horizontal disk 20, and more specifically on the

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2
B opposite side to the anchoring rod 21, an upstand 5 in the shape of an arc of a circle and of variable height. This upstand has a profile which differs from those that make up the upstands described earlier. At the center of rotation C of the upstand 5 there is a second upstand 6 in the shape of an arc of a circle.

✓
Please amend the paragraph on page 14, lines 27-31 as follows:

5
B The upstands 5 and 6 engage in housings, not depicted, but formed on the face 30 of the tibia plate 3 to allow the plate to be guided as it slides in rotation about the center of rotation C, as depicted by the arrow F5.

✓
Please amend the paragraph bridging page 14 and page 15 as follows:

5
B The upstand 6 constitutes a guide mechanism that is in addition to the guide mechanism formed by the upstand 5. Thus, the upstand 6 is positioned on the center of rotation C of the tibia plate 3 on the metal base 2.

Please amend the paragraph on page 15, lines 9-14 as follows:

5
B Figures 16 to 18 depict an alternative form of the knee prosthesis 1 shown in Figure 15, namely wherein the upstand 6 is integral with a flange 60 forming a kind of small plate set out in a horizontal plane parallel to the plane containing the disk 20 of the metal base 2.

Please amend the paragraph on page 15, lines 27-29 as follows:

B 56 The housing 8 has a profile essentially identical to the flange 60 of the additional guide mechanism or upstand 6 for guiding the tibia plate 3 in its travel.

Please amend the paragraph on page 15, lines 31-35 as follows:

B 57 The housing 8 is pierced with an internal slot 80 intended to receive the flange 60 of the upstand 6 to achieve a kind of snap-fastening of the tibia plate 3 to the base 2, so that the plate cannot lift under a tensile force.

Please amend the paragraph on page 16, lines 4-6 as follows:

B 58 As in Figure 12, the metal base 2 and the tibia plate 3 may respectively comprise cutouts 4 and 38 for the passage of the posterior cruciate ligament.

Please amend the paragraph on page 16, lines 8-14 as follows:

B 59 In Figures 19 to 21 the knee prosthesis 1 comprises, on its metal base 2, a first upstand 5' set out at the external periphery of the horizontal disk 20. Opposite the upstand 5' the horizontal disk 20 is secured to another upstand 9 in the shape of an arc of a circle, but the radius of curvature of which is inverted compared with that of the upstand 5'.

Please amend the paragraph on page 16, lines 21-24 as follows:

B60 The upstand 9 constitutes a guide mechanism that is in addition to the guide mechanism formed by the upstand 5'. Thus, the upstand 9 is positioned on the center of rotation C of the tibia plate 3 on the metal base 2.

Please amend the paragraph on page 16, lines 26-29 as follows:

B61 The upstand 9 has the same center of rotation C as the upstand 5', but the center may be offset, depending on the configuration of the knee prosthesis, from the tibia bone vertical axis YY'.

Please amend the paragraph on page 17, lines 1-6 as follows:

B62 On the opposite side to the recess 10, the lower face 30 is pierced with a housing 12 into which the upstand 9 can be snap-fastened to, on the one hand, guide the plate 3 as it slides in rotation about its center C, and, on the other hand, retain the plate to prevent it from lifting off the metal base 2.

Please amend the paragraph on page 17, lines 8-12 as follows:

B63 In Figures 22 to 24 the knee prosthesis 1 comprises the metal base 2, the horizontal disk 20 of which has, on its external periphery, an upstand 13 in the shape of an arc of a

B⁶₃ circle integral with a flange 14 directed toward the tibia bone vertical axis YY'.

✓
Please amend the paragraph on page 17, lines 14-21 as follows:

B⁶₄ The horizontal disk 20 is pierced at the center of rotation C of the upstand 13 with a dish-shaped housing 15 which constitutes a guide mechanism that is in addition to the guide mechanism formed by the upstand 13. This upstand, which is in the shape of an arc of a circle or curved, is positioned in the anterior part of the metal base 2 and oriented in a substantially medio-lateral direction.

✓
Please amend the paragraph bridging pages 17 and 18 as follows:

B⁶₅ The upstand 13 equipped with its flange 14, the housing 15, the recess 10' and its slot 16, and the stub 17 constitute the mechanism of guiding the tibia plate 3 over the metal base 2 as the plate slides in rotation in the direction of the arrow F5.

✓
Please amend the paragraph on page 18, lines 5-8 as follows:

B⁶₆ In Figures 25 and 26, the metal base 2 of the knee prosthesis 1 comprises, on its horizontal disk 20, three peripheral upstands 50, 51 and 52 extending vertically above the horizontal disk 20.

✓
Please amend the paragraph on page 18, lines 10-15 as follows:

B67
The tibia plate 3 comprises, on its external periphery, three peripheral recesses 53, 54 and 55 which are intended to receive the upstands 50, 51 and 52 respectively to allow the plate to be guided as it slides in rotation about the center of rotation of the upstands, which is identical for all three.

✓
Please amend the paragraph on page 18, lines 22-26 as follows:

B68
The upstands 50, 52 in the shape of an arc of a circle constitute guide mechanism which are in addition to the guide mechanism formed by the upstand 51. The upstands 50, 52 are positioned near the center of rotation C of the tibia plate 3 on the metal base 2.

✓
Please amend the paragraph on page 18, lines 28-32 as follows:

B69
In Figures 27 to 29, the metal base 2 of the knee prosthesis 1 comprises, on its horizontal disk 20, vertical pegs 18 set out in an arc of a circle about a center of rotation C which may be either borne by or offset from the tibia bone vertical axis YY'.

✓
Please amend the paragraph bridging pages 18 and 19 follows:

B70
In this example, the tibia plate 3 is identical to the one described in Figures 1 to 3, that is to say that its lower face 30 has a housing 34 intended to receive the pegs 18 for guiding

B70 the plate as it slides in rotation with respect to the metal base 2.

✓
Please amend the paragraph on page 19, lines 16-19 as follows:

B71 Furthermore, it can be seen that the guide mechanism in each example described hereinabove are positioned a certain distance away from the center of rotation C, C'.

✓
Please amend the paragraph on page 19, lines 21-27 as follows:

B72 It will be observed that the short height of the upstand or of the pegs, and its anterior position on the metal base 2 allows the plastic plate 3 to be fitted onto the base easily using a strictly anterior approach, the plate requiring upward clearance only by the height of the upstand or of the pegs as shown in Figure 21.

✓
Please amend the paragraph bridging pages 19 and 20 as follows:

B73 This being so, it will be readily understood that a plastic plate 3 can be obtained in which the dimensions of the housing are identical to those of the upstand or of the corresponding pegs, so as to prevent any travel of the plate over the metal base 2. This allows the surgeon, according to the particular surgical case, to return to a knee prosthesis system with plastic plate which is fixed to the metal base 2, without having to change the latter.
